

## PHASE II SAMPLING DESIGN REQUIREMENTS FOR AMBIENT AIR AT LIBBY OU3 2008

### 1.0 INTRODUCTION

Operable Unit 3 (OU3) of the Libby Asbestos Superfund Site includes the area occupied by the former vermiculite mine as well as lands surrounding the ~~mined area~~ that have been or continue to be impacted by releases from the mine.

One means by which ~~nearby~~ lands near the mine may be impacted by mining-related releases is ~~through airborne transport~~ (past and/or present) of Libby amphibole (LA) asbestos fibers ~~released~~ to air from the mined area. However, adequate data on the levels of past and current airborne releases from the site are not presently available. This memo specifies the general design requirements of an ambient air sampling program to be implemented in 2008 as part of Phase II of the Remedial Investigation for OU3. The primary goals of the sampling effort include the following:

- Characterize the current levels of release of LA from the mine site into ambient air
- Characterize the airborne dispersion of the LA particles as a function of distance and direction from the mine

These data will help support an evaluation of the fate and transport of LA particles in air, as well as an evaluation of risks to humans and ecological receptors from LA in ambient air on and around the mine site. These evaluations, in turn, will help determine if current releases to air are unacceptable and require remedial action to reduce or eliminate the releases.

The details of how the design will be achieved will be developed in an Ambient Air Sampling and Analysis Plan (SAP) to be developed by Remedium.

### 2.0 SUMMARY OF EXISTING DATA

Based on meteorological data collected at the mine site, the predominant direction of wind flow at the mine is to the northeast (**Figure 1**), so it is expected that current releases and historic impacts are likely to be greater in this direction. However, because of the variability in wind direction, releases and impacts are possible in other directions as well.

To date, three studies have been performed as part of the Phase I investigation under the OU3 remedial investigation to obtain preliminary data on the extent of contamination associated with this pathway. These three studies are summarized briefly below.

- Phase I Ambient Air Study. A set of eight ambient air monitoring stations were established in the vicinity of the mined area. Four samples were collected from each station, with each sample representing a 5-day composite collected between October 2 and October 22, 2007. The purpose of these samples was to obtain preliminary data on the level of LA that is currently being released from the mine site. All of the samples were non-detect for LA, at an average analytical sensitivity of  $5.5E-04 \text{ cc}^{-1}$ .  
 → ~~These results suggest that current releases are low~~, but the results must be interpreted cautiously because sampling occurred during and after a wet period that may have substantially reduced emissions compared to dry conditions.
- Phase I Forest Soil Study. Forest soil samples were collected from multiple stations along seven transects radiating outwards from the mined area. Each sample was analyzed for LA by polarized light microscopy using a visual area estimation method (PLM-VE). Results are shown in Figure 2. As seen, LA was observed in some samples, generally within a few miles of the site. One ~~potential~~ limitation to this approach is that the sensitivity of PLM-VE is about 0.2%, so historic impacts to soil below this level may not be detectable. ~~Another potential limitation is that some LA measured in soil might be due to naturally occurring outcrops of the vermiculite ore body rather than transport from the mine.~~ (Ref)
- Phase I Tree Bark Study. Ward has described to occurrence of LA in tree bark samples collected from the vicinity of the mined area. Although the exact source of these fibers is not certain, one potential source is historic impact of airborne fibers from the mine, such that tree-bark levels may provide a measure that is related to historic as well as current releases to air. As part of Phase I, tree bark samples were collected at the same locations as the forest soil samples (see Figure 2), and each was analyzed for LA. The results are shown in Figure 3. As seen, although there is moderate spatial variability, there is a general tendency for the highest levels ( $> 2.5$  million fibers per  $\text{cm}^2$ ) to occur within 1-2 miles of the mined area, with a tendency for values to diminish as a function of distance from the mine. Elevated values are noted not only in the downwind direction (north-northeast from the mine), but also along nearly all transects.

### 3.0 SAMPLING DESIGN

#### 3.1 Study Area for Ambient Air

The choice of the study area for the ambient air monitoring program is based, to the extent feasible, on the data provided by the Phase I studies discussed above. In brief, the ambient air data are not considered to be reliable indicators of current release rates because of the likely inhibiting effect of wet weather at the time sampling was conducted. The forest soil data suggest that releases may have occurred to distances out to several miles, but as noted above, it is possible that releases extend beyond this distance, ~~and that some of the soil results might represent natural levels rather than releases.~~ Based on these considerations, it is concluded that

No fibers were detected but

The implication is that the TB sampling was done to support current releases. No way to distinguish with fiber data

the best available indicator of potentially impacted areas is the tree bark data. Although variable, these data support the view that measurable impacts are most likely to occur within 3-4 miles of the mine (depending on direction).

Based on these considerations, the study area for ambient air is a circle of approximately 4 miles radius centered on the mined area. This study area includes most stations where levels > 0.5 million structures per cm<sup>2</sup> have been observed.

### 3.2 Number and Location of Sampling Stations

A total of 14 ambient air sampling stations will be established during Phase II, as indicated in Figure 4.

#### On-Site Stations

Three stations will be located along the northern (downwind) edge of the mined site, closest to the presumptive source of any current releases, while two will be placed along the southern (upwind) edge of the mined area. The purpose of these upwind-downwind stations is to allow a reliable estimate of the mass of fibers currently being released to air from the site.

#### Perimeter Stations

Sampling stations will be placed along each of four transects established during the Phase I investigation, as follows:

Transect	Number of stations	Distance from site (miles)
Principal downwind transect (45°)	3	1, 2, 4
Principal upwind transect (225°)	2	1, 3-4
Westerly crosswind transect (315°)	2	1, 3-4
Easterly crosswind transect (135°)	2	1, 3-4

Data collected from these stations will allow an evaluation of how concentrations depends on distance and direction from the mine, which will support an evaluation of both fate and transport of LA and also human and ecological exposure levels from ambient air.

### 3.3 Sample Collection Protocol

Ambient air samples will be collected using a protocol similar to that used in the Phase I ambient air sampling program. Because the objective of the sampling effort is to estimate long-term average concentration values, all ambient air samples should be collected using low-flow (2 L/min) stationary air monitors over a 5 day sampling period. In no event shall a sample be collected at a flow rate lower than 0.92 L/min, since the linear flow velocity would fall below 4 cm/sec, which is the minimum velocity specified by ISO 10312.

Samples will be collected using 25-mm diameter, 0.8 µm pore size MCE filter cassettes. All samples will be collected at a height approximately 6 feet above ground level.

Equipment shelters will be used to house the sampling pumps. The use of these shelters will protect the sampling equipment from adverse weather conditions that would otherwise interfere with the collection of long-term samples.

### **3.4 Sample Collection Schedule**

Sampling will begin in the spring of 2008 as soon as weather conditions allow (estimated to be about mid-May), and will continue through the fall of 2008 until weather conditions prohibit further sampling (estimated to be approximately mid-October). Samples will be collected from each station on a bi-weekly schedule (one sample per two weeks). This will result in collection of a total of about 150-170 samples. [REDACTED]

\* 130x 7  
Monitors will be checked periodically during each round of sample collection to identify and correct any problems.

### **3.5 Field QC Samples**

One field blank shall be collected per sampling round.

### **3.6 Analytical Method and Counting/Stopping Rules**

All air samples collected during Phase II will be submitted for asbestos analysis using transmission electron microscopy (TEM) in accord with the International Organization for Standardization (ISO) 10312 method (ISO 1995) counting protocols, with all applicable Libby site-specific laboratory modifications. All amphibole structures (including not only LA but all other asbestos types as well) that have appropriate Selective Area Electron Diffraction (SAED) patterns and Energy Dispersive X-Ray Analysis (EDXA) spectra, and having length greater than or equal to 0.5 µm and an aspect ratio (length:width)  $\geq 3:1$ , will be recorded on the Libby site-specific laboratory bench sheets and electronic data deliverable (EDD) spreadsheets. Data recording for chrysotile (if observed) is not required.

The target analytical sensitivity will be  $0.001 \text{ cc}^{-1}$ . Assuming that typical sample volumes for ambient air samples will be about 5,000-10,000 L and indirect preparations are not necessary, it is expected that an analytical sensitivity of  $0.001 \text{ cc}^{-1}$  can be achieved by counting about 5-10 TEM grid openings (GOs).

For field samples, count the sample until one of the following is achieved:

- The target sensitivity is achieved
- 50 LA structures are observed
- 50 grid opening are evaluated

When one of these goals is achieved, complete the final grid opening and stop.

For field blanks, count 10 grid openings and stop.

### **3.7 Data Reporting**

All ambient air data will be recorded using the most recent version of the Libby TEM EDD for air samples. After data entry and validation by the laboratory, EDDs will be transmitted electronically to:

LibbyOU3@syrres.com

When files are too large to transmit by e-mail, they should be provided on compact disk to the following address:

Lynn Woodbury  
Syracuse Research Corporation  
999 18<sup>th</sup> Street, Suite 1975  
Denver CO 80202

1) Release

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